



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
20.04.2011 Bulletin 2011/16

(51) Int Cl.:
D04B 1/00 (2006.01) D04B 1/24 (2006.01)
D04B 7/00 (2006.01)

(21) Application number: **09758082.3**

(86) International application number:
PCT/JP2009/002418

(22) Date of filing: **01.06.2009**

(87) International publication number:
WO 2009/147815 (10.12.2009 Gazette 2009/50)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA RS

(72) Inventors:
• **NAKA, Hideki**
Wakayama-shi
Wakayama 641-8511 (JP)
• **SHIMASAKI, Yoshinori**
Wakayama-shi
Wakayama 641-8511 (JP)

(30) Priority: **05.06.2008 JP 2008148353**

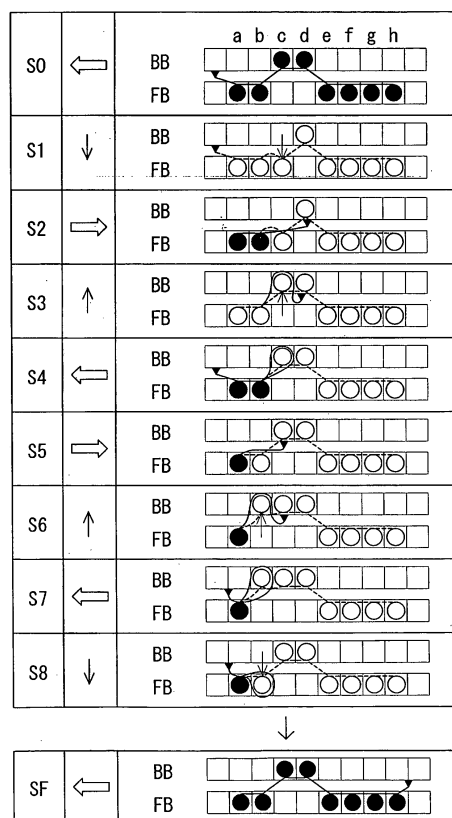
(74) Representative: **Wagner, Karl H.**
Wagner & Geyer
Gewürzmühlstrasse 5
80538 München (DE)

(71) Applicant: **Shima Seiki Mfg., Ltd**
Wakayama-shi
Wakayama 641-8511 (JP)

(54) **PARTIAL KNITTING METHOD AND FABRIC**

(57) A flechage knitting method capable of increasing the number of courses in which flechage knitting can be performed as compared with conventional flechage knitting using tuck. The following steps are carried out to wind a first yarn hooked portion 13 connecting a stitch 11 at a dead end of first forward knitting and a stitch 12 at a starting point of first backward knitting around a first turn-back point stitch 18 in a base course S: step S1 of transferring the first turn-back point stitch 18 of the base course S to an empty needle c of an opposed needle bed; step S2 of performing the first forward knitting, and crossing the first yarn hooked portion 13 connecting to the stitch 11 at the dead end of the first forward knitting with the first turn-back point stitch 18 in a knitting width direction; step S3 of returning the first turn-back point stitch 18 transferred to the empty needle to a knitting needle of an opposite needle bed; and step S4 of forming a stitch 12 on the stitch 11 at the dead end of the first forward knitting to perform the backward knitting with this stitch 12 serving as a starting point.

Fig. 2



Description

TECHNICAL FIELD

[0001] The present invention relates to a flechage knitting method made up of forward knitting and backward knitting, and knitted fabric formed by this knitting method.

BACKGROUND ART

[0002] Conventionally, in knitting of knitted fabric, a flechage knitting method made up of forward knitting and backward knitting has been performed. For example, in Patent Document 1, there is disclosed a knitting method of knitted fabric in which flechage knitting is performed in a neckline portion of a sweater to form a neck hole, and then, a collar portion is formed where the neck hole is formed.

[0003] Fig. 1 is an overall diagram of a sweater 100 made up of a front body 20 and a back body 30. This sweater 100 has a neckline portion 41, which forms a neck hole, and a collar portion 40 formed in this neckline portion 41. Fig. 7 is a knitting process chart for forming the neckline portion 41 and the collar portion 40 on the left side of a paper face of the front body 20 in the sweater 10 by conventional flechage knitting. Fig. 8 is a loop diagram of the knitted fabric formed by this knitting process. In Fig. 7, in three columns arranged in a horizontal direction, a numeric character in the left column denotes a number of a knitting step, the middle column denotes a knitting direction of the knitted fabric in the knitted step, and the right column denotes a knitting state of the knitted fabric. Moreover, a black circle in the right column denotes a stitch formed in the knitted step, a white circle denotes a stitch held in a knitting needle, a V letter denotes a tuck, and a black triangle denotes a yarn feeder. Moreover, FB in the right column in Fig. 7 denotes a front needle bed, BB denotes a back needle bed, and alphabets denote knitting needles. Stitches knitted with the knitting needles of these alphabets in Fig. 7 are the stitches arranged above the alphabets in Fig. 8. In Figs. 7 and 8, a state where a rib structure is knitted using FB and BB is described.

[0004] In the above-described conventional knitting process, the flechage knitting starts to be performed from a state in step S00 (a lowest knitting course in Fig. 8). The flechage knitting is made up of forward knitting (step S01) and backward knitting (step S02), and when the yarn feeder turns back, tuck is performed so as not to produce a hole at a position of a turn-back end in the knitted fabric. This flechage knitting is performed while sequentially displacing the turn-back position, so that the knitting needle of the end portion in a knitting width is sequentially passed over in the knitting to be put into a non-operating state (steps S03 to S08), by which the neckline portion 41 in Fig. 1 is formed. The knitting to the stitches (including the tucks) held in the knitting needles is carried out (step S09) to thereby form the collar portion

40 of the sweater.

PRIOR ART DOCUMENT

5 PATENT DOCUMENT

[0005]

Patent Document 1: Japanese Examined Laid-Open Publication No. 2006-111996

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

15 **[0006]** However, in the above-described conventional flechage knitting method, when the number of times of the flechage knitting becomes large, the knitting becomes difficult, and thus, the number of times of the flechage knitting is limited. Consequently, for example, when the conventional flechage knitting is used for the knitting of the neckline portion of the sweater, the design of the neckline portion is restricted to a shallow neckline.

20 **[0007]** In a process of performing the flechage knitting, in a portion in which the flechage knitting is performed (a region of knitting needles a to e in Fig. 8) in a knitted fabric, new stitches are being formed, so that the portion is going down below a needle bed gap located between front and back needle beds. In contrast, a portion where the flechage knitting is not performed (a region of knitting needles f to h in Fig. 8) remains held in the needle bed. Particularly, in the case of conventional flechage knitting using the tuck, in the portion where the flechage knitting is not performed, a knitting yarn is held doubly in one knitting needle, so that there is little movable margin of the knitting yarn in this portion. That is, the knitted fabric portion where the flechage knitting is not performed inhibits the knitted fabric portion which is being newly formed by performing the flechage knitting from going down below the needle bed gap. Consequently, as the number of times of flechage knitting becomes larger, stitches held in the knitting needles in the portion where the flechage knitting is performed become pushed upward, which causes a possibility that knitting operation (particularly, knock-over) cannot be performed.

30 **[0008]** Moreover, in the knitted fabric knitted by using the conventional flechage knitting, since as shown in Fig. 8, double stitches by the tuck are formed in a border portion between the knitted fabric portion formed by the flechage knitting and the knitted fabric adjoining this knitted fabric portion, the border portion is so conspicuous that appearance of the knitted fabric may be spoiled.

35 **[0009]** The present invention has been made in light of the above-described circumstances, and one object thereof is to provide a flechage knitting method capable of increasing the number of courses in which the flechage knitting can be performed, as compared with the conventional flechage knitting using tuck. Moreover, another ob-

ject of the present invention is to provide a flechage knitting method capable of forming knitted fabric in which a border portion between a knitted fabric portion subjected to the flechage knitting and a knitted fabric portion adjoining this knitted fabric is inconspicuous.

MEANS FOR SOLVING THE PROBLEMS

[0010] The present invention is a flechage knitting method for performing flechage knitting made up of forward knitting and backward knitting, using a flat knitting machine that includes at least a pair of front and back needle beds and is capable of transferring a stitch between the front and back needle beds. The flechage knitting method of the present invention includes performing first flechage knitting made up of first forward knitting and first backward knitting on a base course, the first flechage knitting includes the following steps:

(A) transferring a first turn-back point stitch to an empty needle of an opposite needle bed, the first turn-back point stitch being a stitch, in a forward knitting direction, one ahead of a stitch where a stitch at a dead end of the first forward knitting is to be formed, among stitches in the base course (transferring step).

(B) performing the first forward knitting, and crossing a first yarn hooked portion connecting to the stitch at the dead end of the first forward knitting with the first turn-back point stitch in a knitting width direction (forward knitting step).

(C) returning the first turn-back point stitch transferred to the empty needle, to a knitting needle of the opposite needle bed (returning step).

(D) forming a new stitch on the stitch at the dead end of the first forward knitting to perform the first backward knitting with this stitch serving as a starting point, by which the first yarn hooked portion connecting the stitch at the dead end of the first forward knitting and the stitch at the starting point of the first backward knitting is wound around the first turn-back point stitch in the base course (backward knitting step).

[0011] The order of steps involved in the foregoing first flechage knitting may be selected so that the first yarn hooked portion connecting the stitch at the dead end of the first forward knitting and the stitch at the starting point of the first backward knitting is wound around the first turn-back point stitch of the base course. Specifically, it can be considered that the order is such that the transferring step → the forward knitting step → the returning step → the backward knitting step or such that the forward knitting step → the transferring step → the backward knitting step → the returning step.

[0012] In accordance with one aspect of the flechage knitting method of the present invention, second flechage knitting made up of second forward knitting and second

backward knitting may be performed right after the first flechage knitting. In this case, the second flechage knitting preferably includes the following steps.

(E) transferring a second turn-back point stitch to an empty needle of the opposite needle bed, the second turn-back point stitch being a stitch, in the forward knitting direction, two ahead of the stitch where the stitch at the dead end of the first forward knitting is formed, among the stitches of the base course (transferring step).

(F) performing the second forward knitting with a position of the first turn-back point stitch serving as a dead end, and crossing a second yarn hooked portion connecting to a stitch at the dead end of the second forward knitting with the second turn-back point stitch in the knitting width direction (forward knitting step).

(G) returning the second turn-back point stitch transferred to the empty needle, to a knitting needle of the opposite needle bed (returning step).

(H) forming a new stitch on the stitch at the dead end of the second forward knitting to perform the second backward knitting with this stitch serving as a starting point, by which the second yarn hooked portion connecting the stitch at the dead end of the second forward knitting and the stitch at the starting point of the second backward knitting is wound around the second turn-back point stitch in the base course (backward knitting step).

[0013] The order of steps involved in the foregoing second flechage knitting may be also selected as in the first flechage knitting. Specifically, it can be considered that the order is such that the transferring step → the forward knitting step → the returning step → the backward knitting step or such that the forward knitting step → the transferring step → the backward knitting step → the returning step.

[0014] For the process involved in the second flechage knitting in this flechage knitting method, as in the first flechage knitting, the order may be also selected so that the second yarn hooked portion connecting the stitch at the dead end of the second forward knitting and the stitch at the starting point of the second backward knitting is wound around the second turn-back point stitch of the base course.

[0015] As one aspect of the flechage knitting method of the present invention, it is preferable to further include a step of knitting one course to stitches held in the needle bed after finishing the flechage knitting, wherein in this knitting course, miss knitting is performed at a position of a stitch connecting to the first turn-back point stitch in a wale direction.

[0016] Knitted fabric of the present invention is formed using a flat knitting machine having at least a pair of front and back needle beds and being capable of transferring a stitch between the front and back needle beds, and has

a first flechage knitting portion made up of a first forward knitting course and a first backward knitting course on a base course. The knitted fabric includes: a first turn-back point stitch which is one of stitches of the base course; a stitch at a dead end of the first forward knitting course, the stitch being formed on a stitch next to the first turn-back point stitch; a stitch at a starting point of the first backward knitting course, the stitch being formed on the stitch at the dead end; and a first yarn hooked portion extending from the stitch at the dead end to wind one time around the first turn-back point stitch and then connect to the stitch at the starting point.

[0017] As one aspect of the knitted fabric of the present invention, it may further include a second flechage knitting portion that is formed on the first flechage knitting portion, and is made up of a second forward knitting course and a second backward knitting course. The knitted fabric includes: a second turn-back point stitch adjoining the first turn-back point stitch on an opposite side of the first flechage knitting portion, among the stitches in the base course; a stitch at a dead end of the second forward knitting course, the stitch being formed on the first turn-back point stitch; a stitch at a starting point of the second backward knitting course, the stitch being formed on the stitch at the dead end; and a second yarn hooked portion extending from the stitch at the dead end to wind one time around the second turn-back point stitch and then connect to the stitch at the starting point.

EFFECT OF THE INVENTION

[0018] According to the flechage knitting method of the present invention, the turn back from the forward knitting to the backward knitting is performed by winding the yarn hooked portion connecting the stitch at the dead end of the forward knitting and the stitch at the starting point of the backward knitting around the turn-back point stitch serving as an origin of the turn back. Since this yarn hooked portion is not held in the knitting needle in the knitting process, it has a relatively large movable margin. Moreover, although the turn-back point stitch around which the yarn hooked portion is wound is hooked in the knitting needle, no knitting yarn but this stitch is hooked in the same needle, which gives a movable margin to the turn-back point stitch as well. Consequently, according to the flechage knitting method of the present invention, as compared with the conventional flechage knitting using the tuck, the knitted fabric portion where the flechage knitting is not performed hardly inhibits the knitted fabric portion that are newly formed by performing the flechage knitting from going down below the needle bed gap. As a result, the number of times of the flechage knitting can be increased, thereby enhancing a degree of freedom in designing the knitted fabric.

[0019] Moreover, in the knitted fabric knitted by the flechage knitting method of the present invention, since the stitches are not doubled in the turn-back portion, the turn-back portion is inconspicuous.

[0020] Since the turn-back point stitch is pulled in the knitting width direction by the yarn hooked portion, there may be a slight clearance between the turn-back point stitch and the stitch adjoining this stitch. However, when in a first knitting course knitted after finishing the flechage knitting, miss knitting is performed with the knitting needle holding the first turn-back point stitch, the first turn-back point stitch is pulled up in the wale direction, which makes the clearance vertically long and thus, inconspicuous. The configuration in which the two turn-back point stitches are arranged side by side brings about the similar effect. The reason why the first turn-back point stitch is pulled up in the wale direction as described above is that the miss knitting decreases the number of stitches continuous to the first turn-back point stitch on the upper side in the wale direction by one.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is an overall diagram of a sweater having turn-back portions.

Fig. 2 is a knitting process chart of flechage knitting according to Embodiment 1.

Fig. 3 is a loop diagram of knitted fabric formed by the knitting process of Embodiment 1.

Fig. 4 is a knitting process chart of flechage knitting according to Embodiment 2.

Fig. 5 is a loop diagram of knitted fabric formed by the knitting process of Embodiment 2.

Fig. 6(A) and (B) are enlarged photographs of the turn-back portions, (A) showing knitted fabric using a flechage knitting method of the present invention, and (B) showing knitted fabric using a conventional flechage knitting method.

Fig. 7 is a knitting process chart of the conventional flechage knitting method.

Fig. 8 is a loop diagram of the knitted fabric formed by the conventional knitting process.

PREFERRED EMBODIMENT FOR CARRYING OUT THE INVENTION

[0022] Next, preferred embodiments (Embodiments 1, 2) of the present invention are described in detail with reference to the drawings. In both of Embodiments 1, 2, examples in which the sweater 100 is knitted are described, the sweater 100 being tubular knitted fabric made up of the front body 20 and the back body 30 as shown in Fig. 1. This sweater 100 is formed with the collar portion 40 at the neckline portion 41, and for the knitting of this neckline portion 41 and the collar portion 40, flechage knitting of the present invention is used. Obviously, the flechage knitting method of the present invention can be applied to any knitted fabric having a portion in which the flechage knitting is performed, and thus, an application object is not limited to the tubular knitted fab-

ric.

[0023] First, a flat knitting machine used in these embodiments is described. The flat knitting machine is a flat knitting machine having at least a pair of front and back needle beds extending in a traverse direction and disposed opposite to each other in a cross direction. As the above-described flat knitting machine, a two-bed flat knitting machine including a front needle bed (hereinafter, referred to as FB), and a back needle bed (hereinafter, referred to as BB), a four-bed flat knitting machine further including two needle beds opposite to each other above the front and back needle beds, and the like can be cited.

<Embodiment 1>

[0024] In order to knit the collar portion 40 of the sweater 100 as shown in Fig. 1, using the above-described flat knitting machine, the front body 20 is knitted up to a position 50 at a lower end of the collar portion 40, and an outline of the neckline portion 41 is formed by flechage knitting. The collar portion 40 is knitted on stitches making up the neckline portion 41. In the following description, only the formation of the neckline portion 41 on the left side of a paper face in Fig. 1 and the formation of the collar portion 40 following this are schematically described.

[0025] Fig. 2 is a knitting process chart showing the flechage knitting in the neckline portion 41 and the knitting of the collar portion 40 in the sweater 100 (up-down thin arrows in the middle column and in the right column denote transfer). Moreover, Fig. 3 is a loop diagram of knitted fabric formed by the knitting process in Fig. 2, and numeric characters arranged on the right and on the left in Fig. 3 denote the order of knitting a knitting course of interest. The way of viewing these Figs. 2, 3 (Figs. 4, 5 described later) is the same as that of Figs. 7, 8 referred to in the description of Background Art. Figs. 2, 3 (Figs. 4, 5 described later) illustrate a rib structure where front stitches and back stitches are formed as they coexist using FB and BB, in which the numbers of knitting courses and stitches are smaller than actual knitted fabric for convenience of description.

[0026] Step S0 in Fig. 2 shows a state where the knitting up to the position 50 at the lower end of the collar portion 40 in the sweater 100 shown in Fig. 1 is finished. A knitting course S (refer to Fig. 3), which is knitted in step S0 to serve as a base course, has a rib structure.

[0027] In order to start to form the neckline portion in the state of step S0, initial first flechage knitting made up of first forward knitting and first backward knitting is carried out. Stitches given reference numerals in the following description are shown with the reference numerals in Fig. 3.

[0028] First, when the first flechage knitting starts to be performed, a stitch held in a knitting needle c of BB (a first turn-back point stitch 18) among stitches of the knitting course S is transferred to a knitting needle c of opposite FB (step S1). This knitting needle c of BB is

located one ahead of a knitting needle b in a movement direction of the knitting, in which the knitting needle b will be at a position as a dead end of a first forward knitting course formed in step S2.

[0029] Next, the first forward knitting to form stitches with knitting needles a, b of FB is performed (step S2), by which a knitting course 1 in Fig. 3 is formed. At this time, the yarn feeder passes over a position of the knitting needle c so that a knitting yarn extending from a stitch 11 at the dead end of the knitting course 1, which is held in knitting needle b, (a first yarn hooked portion 13) crosses the transferred first turn-back point stitch 18 (the knitting needle c of FB) in a knitting width direction.

[0030] The first turn-back point stitch 18 transferred to the knitting needle c of FB in step S1 is returned to the knitting needle c of BB (step S3), and the first backward knitting is performed (step S4). At this time, a stitch 12 at a starting point of the first backward knitting is formed on the stitch 11 at the dead end of the first forward knitting, which is held in the knitting needle b.

[0031] In these steps S1 to S4, the first flechage knitting portion made up of the knitting course 1 and a knitting course 2 in Fig. 3 is formed, and the first yarn hooked portion 13 connecting the stitch 11 at the dead end of the knitting course 1 formed by the first forward knitting and the stitch 12 at the starting point of the knitting course 2 formed by the first backward knitting is wound by one turn around the first turn-back point stitch 18 held in the knitting needle c of the knitting course S.

[0032] Since the yarn hooked portion 13 in the first flechage knitting portion is not held in the knitting needle, it has a relatively large movable margin. Moreover, the turn-back point stitch 18 around which the yarn hooked portion 13 is wound also has a movable margin, because although it is hooked on the knitting needle, no knitting yarn other than this stitch is hooked on the same knitting needle. Consequently, the knitted fabric portion subjected to the flechage knitting is hardly inhibited from going down below a needle bed gap by a knitted fabric portion where the flechage knitting is not performed.

[0033] Next, according to a procedure shown in steps S5 to S8 in Fig. 2, the first flechage knitting is carried out again with the knitting course 2 in Fig. 3 serving as a base course to knit the knitting courses 3, 4. However, the next turn-back point stitch 18 (which is also the stitch 12 at the starting point in steps S1 to S4) is a stitch knitted in FB. Consequently, similar to the yarn hooked portion 13 in steps S1 to S4, in order to wind the yarn hooked portion 13 in steps S5 to S8 from an inner side (an inner side of the tube) to an outer side, the order of the steps involved in the first flechage knitting is changed. Specifically, the knitting is performed in the order of the forward knitting step (step S5) → the transferring step (step S6) → the backward knitting step (step S7) → a returning step (step S8) to thereby knit the knitting courses 3, 4 in Fig. 3. In the knitting in these steps S5 to S8 as well, since there is a movable margin in each of the yarn hooked portion 13 and the turn-back point stitch 18, the knitted fabric

portion where the flechage knitting is not performed hardly inhibits the knitted fabric portion subjected to the flechage knitting from going down below the needle bed gap.

[0034] When the flechage knitting of the required number of times is finished, the knitting is finally performed by one course to the stitches held in the knitting needles of the needle bed (step SF), and then the formation of the collar portion with a knitting course 5 serving as a first knitting course is started. In a knitting course 6 and after, a predetermined number of courses are knitted to form the collar portion following the knitting course 5.

[0035] When the flechage knitting is further performed in addition to the knitting courses shown in Figs. 2, 3, the above-described knitting in step S1 to S4 and knitting in step S5 to S8 may be appropriately combined and repeated a required number of times. As described before, according to the flechage knitting method of the present embodiment, since the knitted fabric portion where the flechage knitting is not performed hardly inhibits the knitted fabric portion subjected to the flechage knitting from going down below the needle bed gap, the number of times of flechage knitting can be made larger than the case where the conventional flechage knitting method is used. As a result, a sweater with a deep neckline portion can be knitted.

[0036] Generally, when the tubular knitted fabric having a rib structure is formed, the need to transfer the stitches between the front and back needle beds arises. In the case where the flechage knitting is performed in this tubular knitted fabric, the stitch of the turn-back portion is also to be transferred. In the conventional flechage knitting, the knitting yarn hooked doubly in the knitting needle of the turn-back portion is transferred, which causes a possibility of failing the transfer. In contrast, according to the flechage knitting of the present embodiment, since the tuck is not performed, the transfer in the turn-back portion can be performed easily.

<Embodiment 2>

[0037] In Embodiment 2, a flechage knitting method for arranging two turn-back point stitches as origins of the turn-back side by side in the knitting width direction is described with reference to the drawings.

[0038] Fig. 4 is a knitting process chart showing flechage knitting in the neckline portion 41 and the knitting of the collar portion 40 in the sweater 100. Moreover, Fig. 5 is a loop diagram of knitted fabric formed by the knitting process in Fig. 4.

[0039] First, in step S10 of Fig. 4, a state where a rib structure is knitted up to the position of the lower end 50 of the collar portion 40 in Fig. 1, using FB and BB is shown. This allows a base course (knitting course S) in Fig. 5 to be knitted.

[0040] In the state in step S10, the flechage knitting starts to be carried out so as to form the neckline portion 41. The flechage knitting is made up of the first flechage

knitting in steps S11 to S14 and second flechage knitting in step S15 to step S18.

[0041] The first flechage knitting is carried out in accordance with a similar procedure to the first flechage knitting in Embodiment 1. That is, it is carried out in the order of the transferring step (step S11) → the forward knitting step (step S12) → the returning step (step S13) → the backward knitting step (step S14).

[0042] According to these steps S11 to S14, the knitting course 1 and the knitting course 2 in Fig. 5 are knitted, and the first yarn hooked portion 13 connecting the stitch 11 at the dead end of the knitting course 1 formed by the first forward knitting and the stitch 12 at the starting point of the knitting course 2 formed by the first backward knitting is wound by one turn around the first turn-back point stitch 18 of the knitting course S. The stitch 12 at the starting point of the knitting course 2 is formed in a wale direction continuous to the stitch 11 at the dead end of the knitting course 1. Moreover, the stitch 11 at the dead end is formed in the wale direction continuous to a stitch on the left of the first turn-back point stitch 18 in the knitting course S.

[0043] Next, the second flechage knitting in steps S15 to S18 is carried out. This second flechage knitting is also carried out in the order of the transfer step (step S15) → the forward knitting step (step S16) → the returning step (step S17) → the backward knitting step (step S18).

[0044] According to these steps S15 to S18, the knitting course 3 and the knitting course 4 in Fig. 5 are knitted, and a second yarn hooked portion 16 connecting a stitch 14 at a dead end of the knitting course 3 formed by second forward knitting and a stitch 15 at a starting point of the knitting course 4 formed by second backward knitting is wound by one turn around a second turn-back point stitch 19 of the knitting course S. The stitch 14 at the dead end of the knitting course 3 is formed in the wale direction continuous to the first turn-back point stitch 18 in the knitting course S. Moreover, the stitch 15 at the starting point of the knitting course 4 is formed in the wale direction continuous to the stitch 14 at the dead end of the knitting course 3.

[0045] The flechage knitting in the above-described steps S11 to S18 is repeated a required number of times to form the neckline portion 41 of the actual knitted fabric, by which the neckline portion 41 of the sweater 100 in Fig. 1 is completed. In the flechage knitting of the present embodiment, as in Embodiment 1, the yarn hooked portions 13, 16 as the turn-back portions are simply wound around the turn-back point stitches 18, 19, respectively. Consequently, since the knitted fabric portion where the flechage knitting is not performed hardly inhibits the knitted fabric portion subjected to the flechage knitting from going down below the needle bed gap, the number of times of flechage knitting can be made larger than that of the conventional example.

[0046] Further, in the present embodiment, in step S1F in which the formation of the collar portion 40 is started, in the knitting needles c, e with each of which the first

turn-back point stitch 18 is formed, miss knitting is performed. This knitting allows the stitch 14 at the dead end formed in the wale direction continuous to the first turn-back point stitch 18 and the stitch 15 at the starting point to be pulled by a stitch 17 above the stitch 15 at the starting point by two knitting courses (i.e., a course 10), as shown in Fig. 5. That is, the first turn-back point stitch 18 pulled to the left side in the knitting width direction by the yarn hooked portion 13 is also pulled in the wale direction at the same time, and thus, a clearance produced between the first turn-back point stitch 18 and the second turn-back point stitch 19 adjoining this stitch 18 becomes vertically long, which makes the clearance inconspicuous. Moreover, since the second turn-back point stitch 19 is also pulled obliquely upward by the second yarn hooked portion 16 connecting from the stitch 14 at the dead end to the stitch 15 at the starting point, a clearance between the second turn-back point stitch 19 and the stitch adjoining this second turn-back point stitch 19 in the right direction of a paper face becomes vertically long, which makes the clearance inconspicuous.

<Comparison of Knitted Fabric>

[0047] Finally, the knitted fabric formed by the flechage knitting method of the present invention and the knitted fabric formed by the conventional flechage knitting are compared. Fig. 6 shows enlarged photographs of the turn-back portions of the knitted fabric, (A) showing the knitted fabric using the flechage knitting method of the present invention, and (B) showing the knitted fabric using the conventional flechage knitting method.

[0048] As is obvious from Fig. 6, in the knitted fabric using the conventional flechage knitting method, the turn-back portions are conspicuous, while in the knitted fabric using the flechage knitting method of the present invention, the turn-back portions are not so conspicuous. Particularly, in the conventional knitted fabric, the turn-back portions in a region of back stitches are remarkably conspicuous, while in the knitted fabric of the present invention, the turn-back portions are vague and inconspicuous.

[0049] Embodiments of the present invention are not limited to the above-described embodiments, but can be modified within the scope not departing from the gist of the present invention as needed. For example, the knitted fabric to which the flechage knitting of the present invention is applied may be a sheet of knitted fabric instead of being tubular. Moreover, the portion to which the flechage knitting is applied is not limited to the neckline portion, but may be, for example, a gore portion, a shoulder line portion or the like. Furthermore, the portion to which the flechage knitting is applied may have a rib structure different from that in the embodiments (e.g., a rib structure of 2×2), or may have a structure other than the rib structure, for example, a structure of plain knitting.

DESCRIPTION OF REFERENCE NUMERALS

[0050]

5	100	sweater
	20	front body
	30	back body
	40	collar portion
	41	neckline portion
10	50	position, at a lower end of a collar portion
	S1 to S10	knitting course
	11	stitch at a dead end (first forward knitting)
	12	stitch at a starting point (first backward knitting)
15	13	first yarn hooked portion
	18	first turn-back point stitch
	14	stitch at a dead end (second forward knitting)
	15	stitch at a starting point (second backward knitting)
20	16	second yarn hooked portion
	19	second turn-back point stitch
	17	stitch of a knitting course 10

Claims

1. A flechage knitting method for performing flechage knitting made up of forward knitting and backward knitting, using a flat knitting machine that includes at least a pair of front and back needle beds and is capable of transferring a stitch between the front and back needle beds, the method including performing first flechage knitting made up of first forward knitting and first backward knitting on a base course, the first flechage knitting comprising the steps of:

(A) transferring a first turn-back point stitch to an empty needle of an opposite needle bed, the first turn-back point stitch being a stitch, in a forward knitting direction, one ahead of a stitch where a stitch at a dead end of the first forward knitting is to be formed, among stitches in the base course;

(B) performing the first forward knitting, and crossing a first yarn hooked portion connecting to the stitch at the dead end of the first forward knitting with the first turn-back point stitch in a knitting width direction;

(C) returning the first turn-back point stitch transferred to the empty needle, to a knitting needle of the opposite needle bed; and

(D) forming a new stitch on the stitch at the dead end of the first forward knitting to perform the first backward knitting with this stitch serving as a starting point, by which the first yarn hooked portion connecting the stitch at the dead end of the first forward knitting and the stitch at the start-

ing point of the first backward knitting is wound around the first turn-back point stitch in the base course.

2. The flechage knitting method according to claim 1, wherein second flechage knitting made up of second forward knitting and second backward knitting is performed after the first flechage knitting, the second flechage knitting comprising the steps of:

(E) transferring a second turn-back point stitch to an empty needle of the opposite needle bed, the second turn-back point stitch being a stitch, in the forward knitting direction, two ahead of the stitch where the stitch at the dead end of the first forward knitting is formed, among the stitches of the base course;

(F) performing the second forward knitting with a position of the first turn-back point stitch serving as a dead end, and crossing a second yarn hooked portion connecting to a stitch at the dead end of the second forward knitting with the second turn-back point stitch in the knitting width direction;

(G) returning the second turn-back point stitch transferred to the empty needle, to a knitting needle of the opposite needle bed; and

(H) forming a new stitch on the stitch at the dead end of the second forward knitting to perform the second backward knitting with this stitch serving as a starting point, by which the second yarn hooked portion connecting the stitch at the dead end of the second forward knitting and the stitch at the starting point of the second backward knitting is wound around the second turn-back point stitch in the base course.

3. The flechage knitting method according to claim 1 or claim 2, further comprising the step of knitting one course to stitches held in the needle bed after finishing the flechage knitting, wherein in this knitting course, miss knitting is performed at a position of a stitch in a wale direction connecting to the first turn-back point stitch.

4. Knitted fabric that is formed using a flat knitting machine having at least a pair of front and back needle beds and being capable of transferring a stitch between the front and back needle beds, and has a first flechage knitting portion made up of a first forward knitting course and a first backward knitting course on a base course, the knitted fabric comprising:

a first turn-back point stitch which is one of stitches of the base course;

a stitch at a dead end of the first forward knitting course, the stitch being formed on a stitch next

to the first turn-back point stitch;

a stitch at a starting point of the first backward knitting course, the stitch being formed on the stitch at the dead end; and

a first yarn hooked portion extending from the stitch at the dead end to wind one time around the first turn-back point stitch and then connect to the stitch at the starting point.

5. The knitted fabric according to claim 4, further comprising a second flechage knitting portion that is formed on the first flechage knitting portion, and is made up of a second forward knitting course and a second backward knitting course, the knitted fabric comprising:

a second turn-back point stitch adjoining the first turn-back point stitch on an opposite side of the first flechage knitting portion, among the stitches in the base course;

a stitch at a dead end of the second forward knitting course, the stitch being formed on the first turn-back point stitch;

a stitch at a starting point of the second backward knitting course, the stitch being formed on the stitch at the dead end; and

a second yarn hooked portion extending from the stitch at the dead end to wind one time around the second turn-back point stitch and then connect to the stitch at the starting point.

Fig. 1

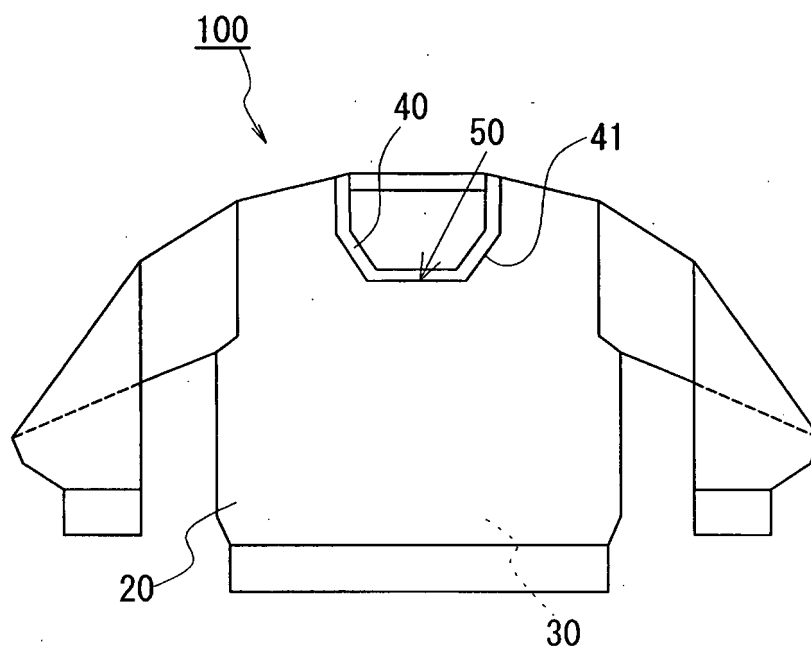


Fig. 2

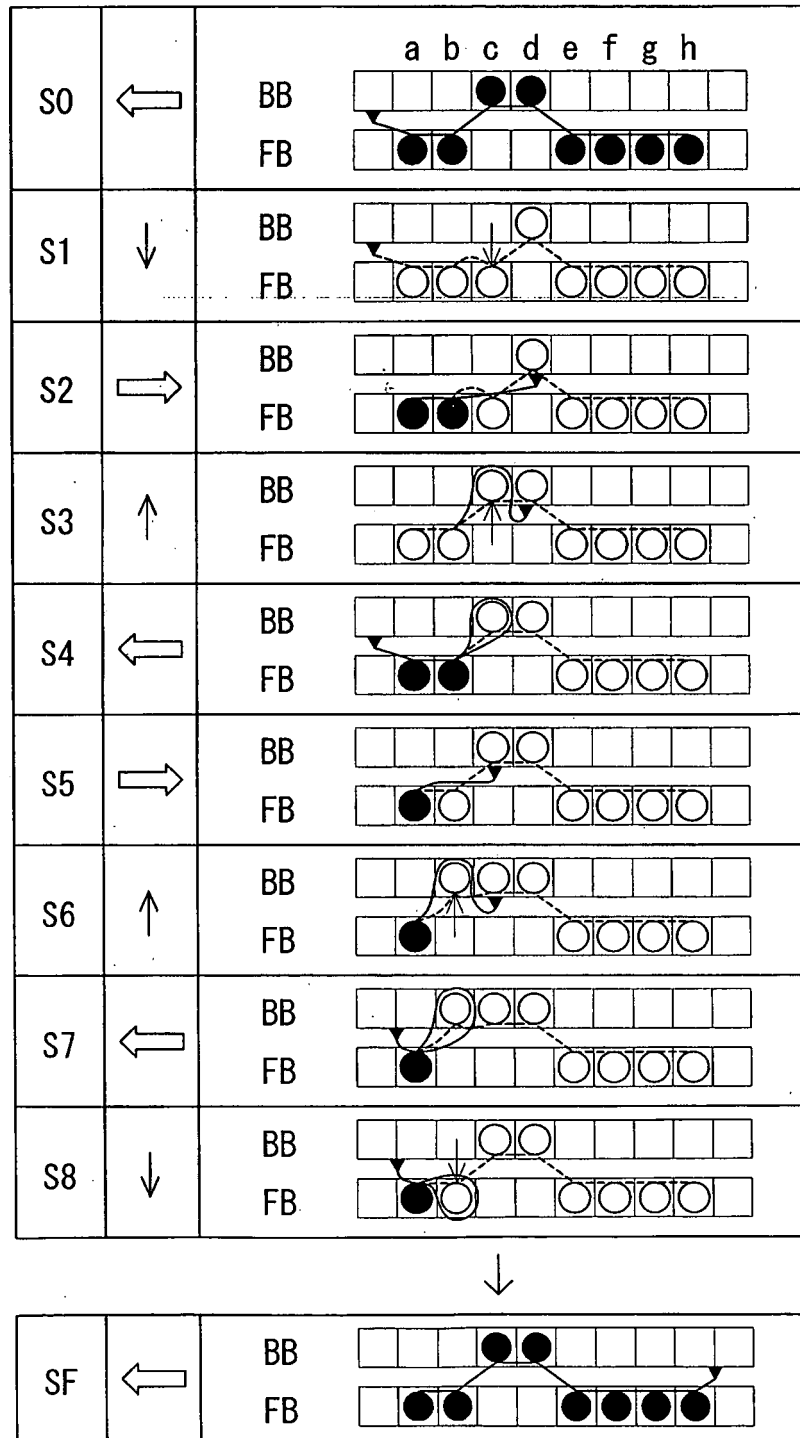


Fig. 3

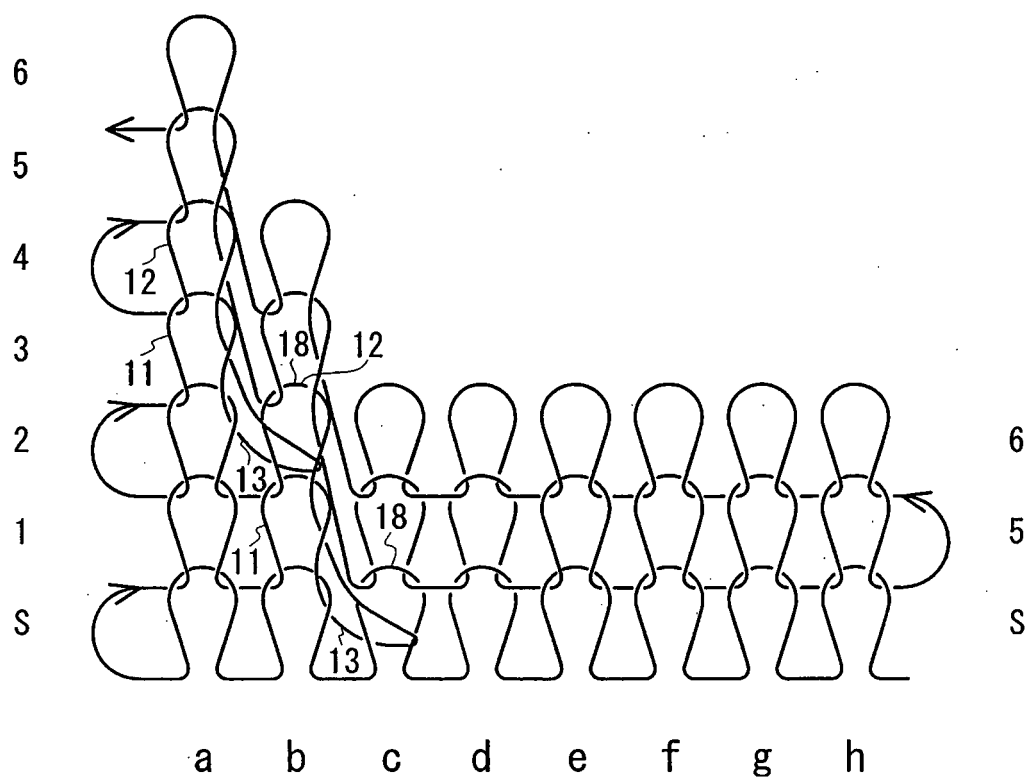


Fig. 4

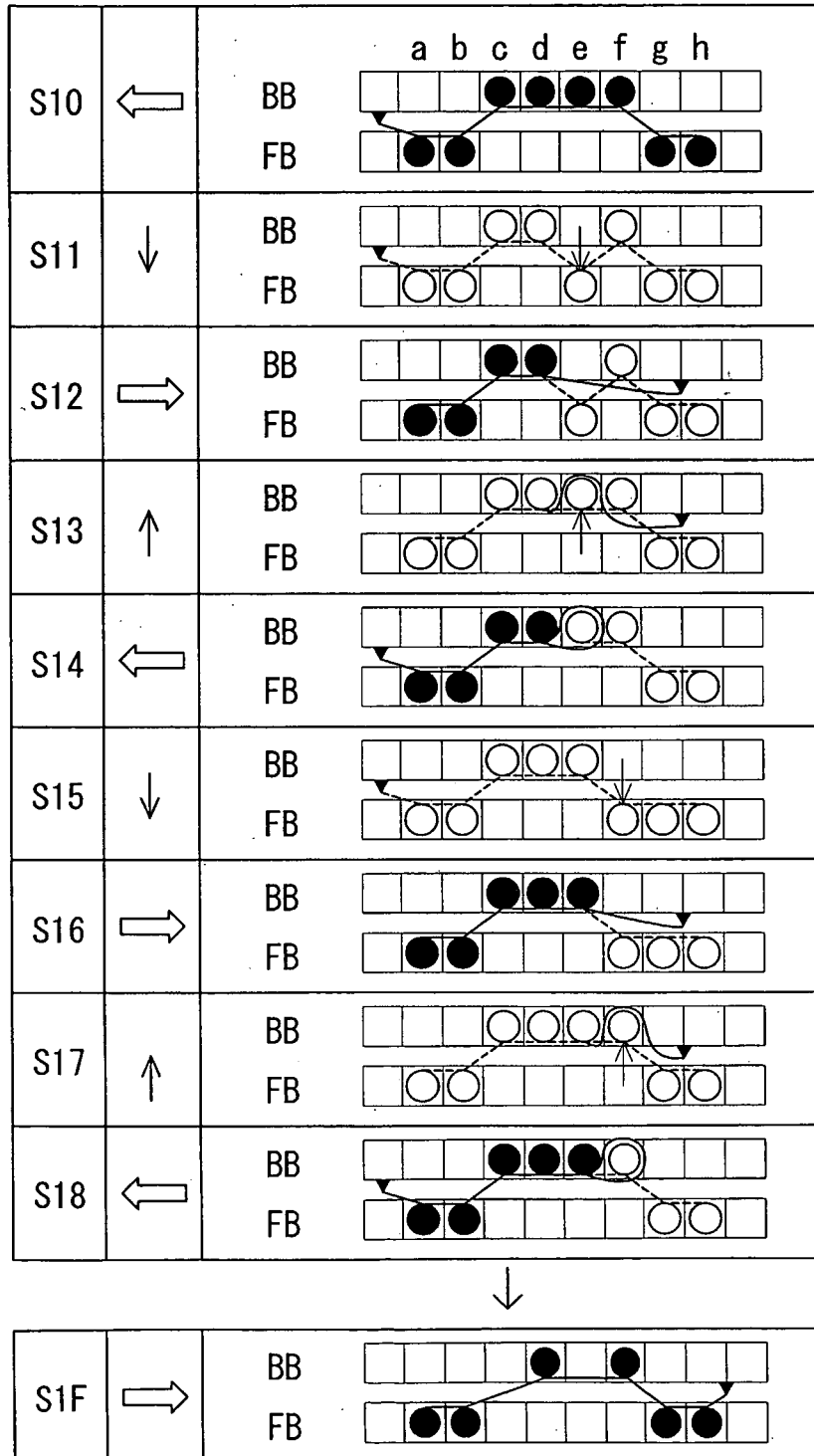


Fig. 5

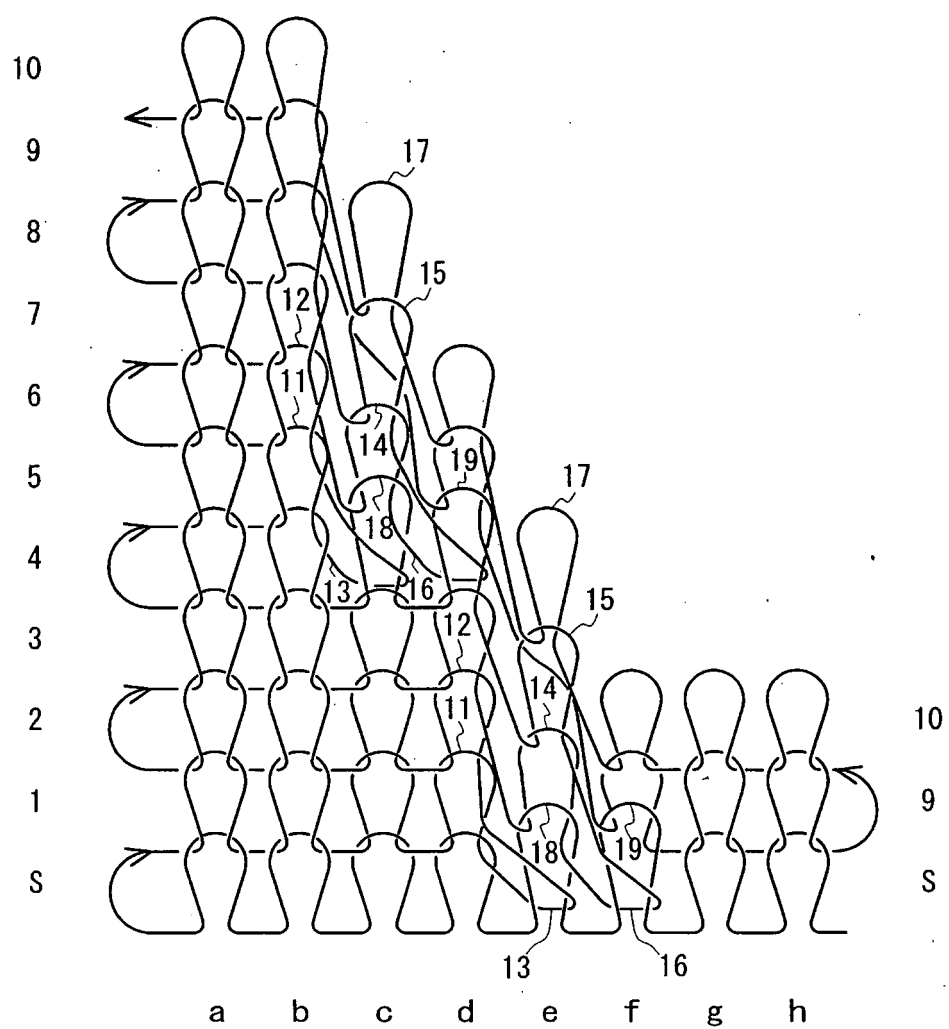
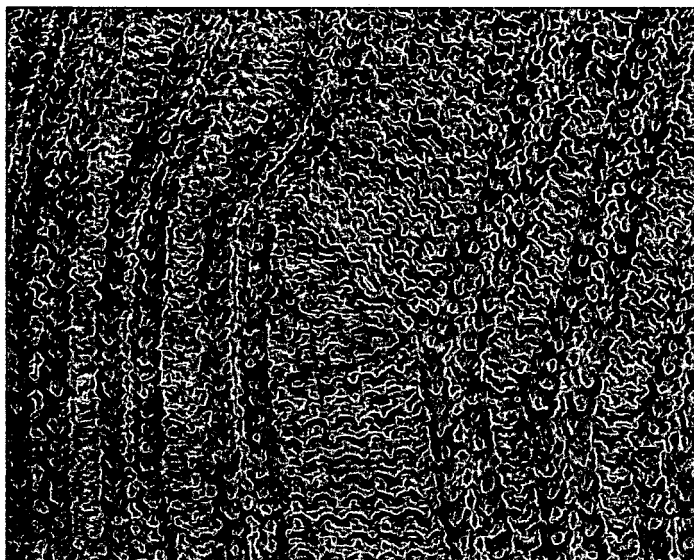


Fig. 6

(A)



(B)

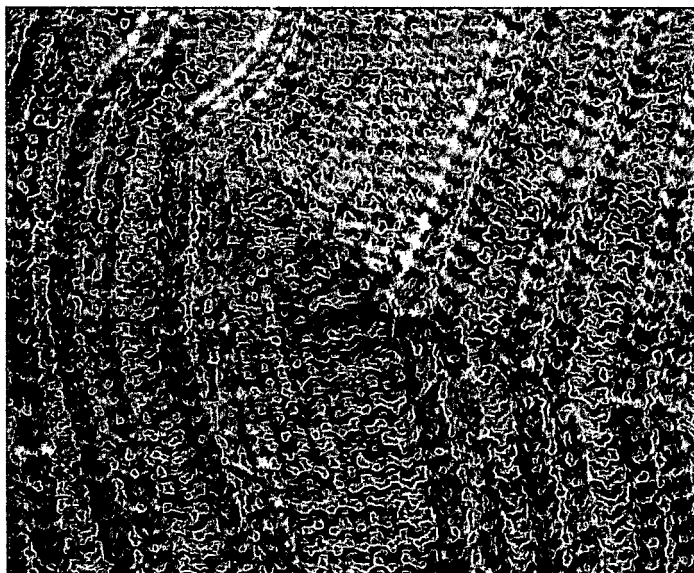


Fig. 7

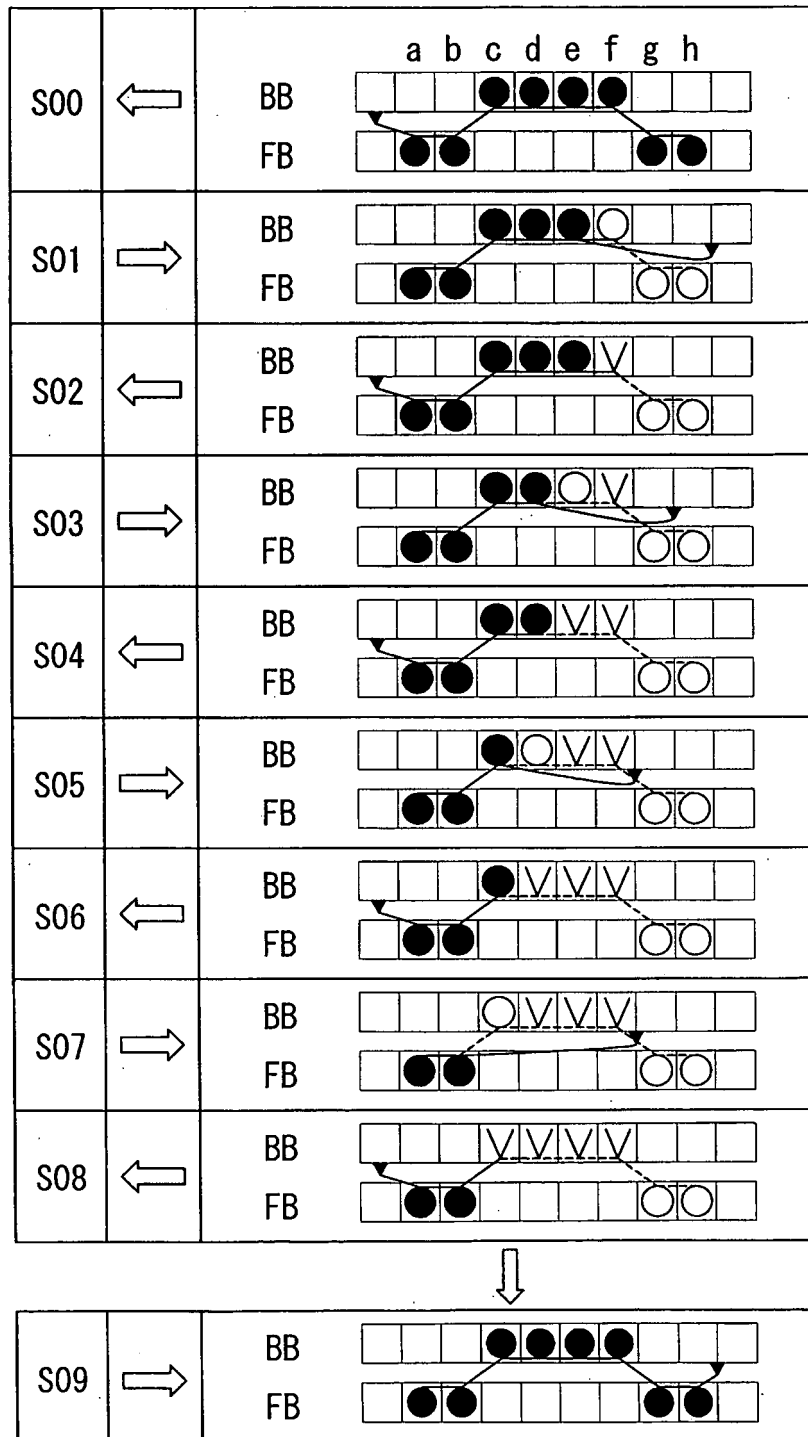
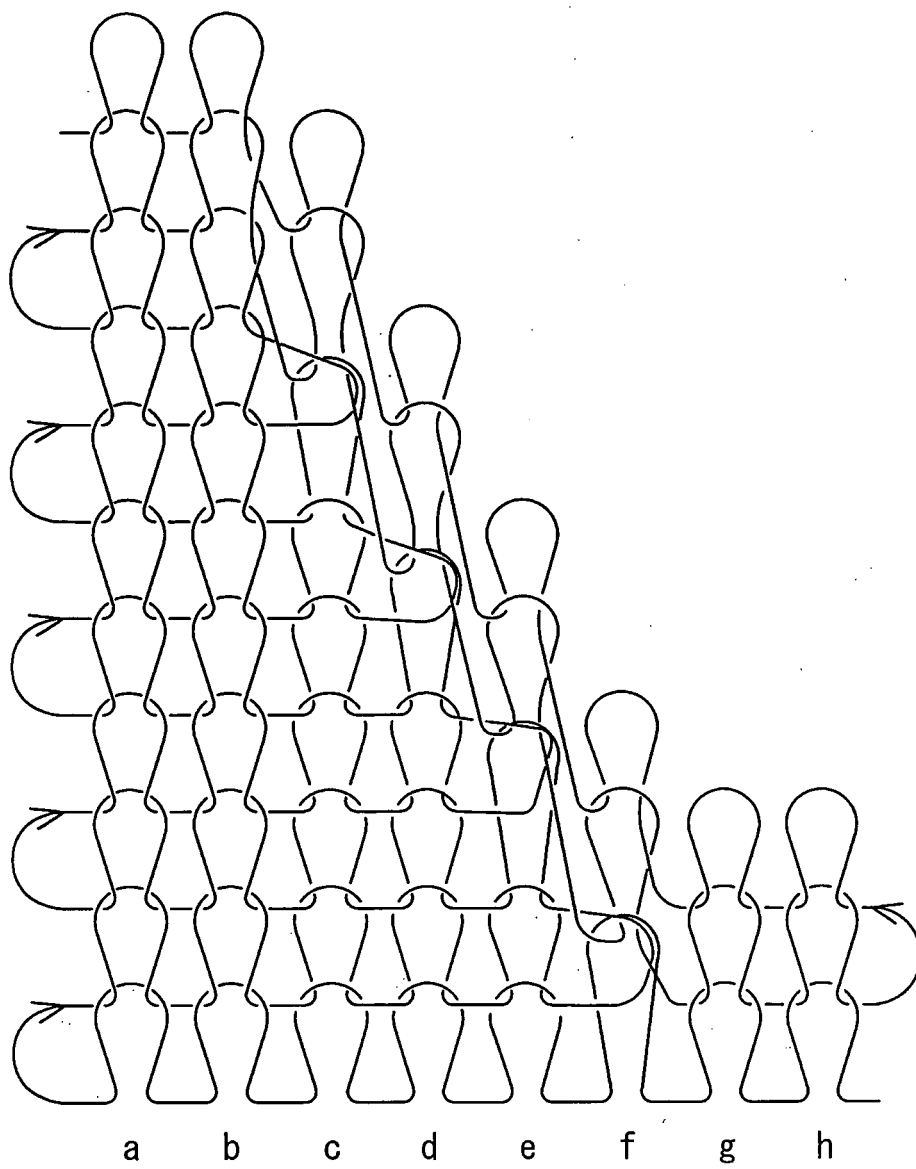


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/002418

A. CLASSIFICATION OF SUBJECT MATTER

D04B1/00(2006.01) i, D04B1/24(2006.01) i, D04B7/00(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D04B1/00-39/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2009
Kokai Jitsuyo Shinan Koho	1971-2009	Toroku Jitsuyo Shinan Koho	1994-2009

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2006-111996 A (Shima Seiki Mfg., Ltd.), 27 April, 2006 (27.04.06), Claim 1; example 1 & WO 2006/040952 A1	1-5
A	JP 2006-161231 A (Shima Seiki Mfg., Ltd.), 22 June, 2006 (22.06.06), Claim 1; Par. No. [0020] & EP 1829996 A1 & WO 2006/062068 A1 & CN 101072907 A	1-5

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
28 July, 2009 (28.07.09)Date of mailing of the international search report
11 August, 2009 (11.08.09)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2006111996 A [0005]